

WHAT IS CLAIMED IS:

1 1. A semiconductor film, comprising:
2 a substrate; and
3 a graded gallium nitride layer deposited on the substrate having a varying
4 composition of a substantially continuous grade from an initial composition to a final
5 composition formed from a supply of at least one precursor in a growth chamber without any
6 interruption in the supply.

1 2. The semiconductor film of claim 1, wherein the graded gallium nitride layer is
2 deposited using metalorganic chemical vapor deposition (MOCVD).

1 3. The semiconductor film of claim 1, wherein the graded gallium nitride layer
2 has a net compressive stress.

1 4. The semiconductor film of claim 1, wherein the graded gallium nitride layer is
2 deposited by changing a vapor pressure of the supply of at least one precursor in a growth
3 chamber for the graded gallium nitride layer.

1 5. The semiconductor film of claim 1, wherein the precursor is gallium,
2 aluminum or nitrogen.

1 6. The semiconductor film of claim 1, wherein the graded gallium nitride layer is
2 deposited by changing a parameter of the growth chamber for the graded gallium nitride
3 layer.

1 7. The semiconductor film of claim 6, wherein the parameter of the growth
2 chamber is a total pressure, a temperature of the substrate, a total flow, a rate of substrate
3 rotation or a reactor wall temperature.

1 8. The semiconductor film of claim 1, wherein the graded gallium nitride layer is
2 deposited by changing the geometry of the growth chamber for the graded gallium nitride
3 layer.

1 9. The semiconductor film of claim 8, wherein changing the geometry of the
2 growth chamber comprises moving the substrate relative to injectors of the growth chamber.

1 10. The semiconductor film of claim 1, wherein the substrate is silicon or silicon
2 carbide.

1 11. The semiconductor film of claim 1, wherein the initial composition is a high
2 aluminum composition.

1 12. The semiconductor film of claim 1, wherein the initial composition is
2 aluminum nitride or a high aluminum content aluminum gallium nitride.

1 13. The semiconductor film of claim 1, wherein the final composition is a low
2 aluminum composition.

1 14. The semiconductor film of claim 1, wherein the final composition is gallium
2 nitride or a low aluminum content aluminum gallium nitride.

1 15. The semiconductor film of claim 1, further comprising at least one additional
2 layer disposed on the graded gallium nitride layer.

1 16. The semiconductor film of claim 1, wherein at least one other element is
2 introduced into the growth chamber for the graded gallium nitride layer causing no abrupt
3 variations in the varying composition of the graded gallium nitride layer.

1 17. The semiconductor film of claim 16, wherein the other element is silicon,
2 indium or arsenic.

1 27. The method of claim 18, wherein the substrate is silicon or silicon carbide.

1 28. The method of claim 18, wherein the initial composition is a high aluminum
2 composition.

1 29. The method of claim 18, wherein the initial composition is aluminum nitride
2 or a high aluminum content aluminum gallium nitride.

1 30. The method of claim 18, wherein the final composition is a low aluminum
2 composition.

1 31. The method of claim 18, wherein the final composition is gallium nitride or a
2 low aluminum content aluminum gallium nitride.

1 32. The method of claim 18, further comprising depositing at least one additional
2 layer on the graded gallium nitride layer.

1 33. The method of claim 18, wherein the step of forming the graded gallium
2 nitride layer comprises introducing at least one other element into the growth chamber for the
3 graded gallium nitride layer causing no abrupt variations in the varying composition of the
4 graded gallium nitride layer.

1 34. The method of claim 33, wherein the other element is silicon, indium or
2 arsenic.